

# Claims

[c1] What is claimed is:

1.An MR coil assembly comprising:

a volume coil arrangement situated to generate a polarized field about a subject to be imaged;

multiple drive ports connected to a common end of the volume coil arrangement; and

multiple drive cables connectable to a voltage source at one end and connected to the multiple drive ports at another end to apply voltages to the multiple drive ports such that the volume coil arrangement generates a substantially circular polarized field independent of subject asymmetry.

[c2] 2.The assembly of claim 1 further comprising fewer drive cables than drive ports.

[c3] 3.The assembly of claim 1 further comprising a balun connected to each drive port.

[c4] 4.The assembly of claim 3 further comprising a splitter connected to each drive cable and a pair of baluns.

[c5] 5.The assembly of claim 4 wherein each drive port is connected to receive a voltage that is 90 degrees out-

of-phase from a voltage applied to a neighboring drive port.

[c6] 6.The assembly of claim 1 wherein the common end of the volume coil arrangement is a superior end-ring of the volume coil arrangement.

[c7] 7.The assembly of claim 1 wherein the volume coil arrangement includes sixteen coil elements arranged in a birdcage configuration.

[c8] 8.The assembly of claim 2 wherein the multiple drive ports include four drive ports and the multiple drive cables include two drive cables.

[c9] 9.The assembly of claim 1 wherein the volume coil arrangement is constructed such that a center thereof is not a virtual ground plane.

[c10] 10.An MRI apparatus comprising:  
a magnetic resonance imaging (MRI) system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR data from a subject, the RF coil assembly having:  
a plurality of RF coils arranged in a birdcage arrange-

ment to transmit RF energy toward the subject at least partially positioned in a volume-of-interest; and a number of drive ports to receive an applied voltage to drive the plurality of RF coils and maintain a substantially circular polarized field about the volume-of-interest independent of subject contact with the RF coil assembly.

[c11] 11.The MRI apparatus of claim 10 wherein the RF coil assembly includes a balun electrically connected to each drive port to couple balanced and unbalanced inputs.

[c12] 12.The MRI apparatus of claim 11 further comprising at least one splitter, each splitter electrically connected to apply a phase-shifted voltage input to each balun of a pair of baluns.

[c13] 13.The MRI apparatus of claim 12 further comprising a pair of voltage inputs, a first input electrically connected to a first splitter and a second input electrically connected to a second splitter.

[c14] 14.The MRI apparatus of claim 13 wherein the first input is 90 degrees out-of-phase from the second input.

[c15] 15.The MRI apparatus of claim 11 wherein each splitter is constructed to perform a  $\pm 90$  degree phase shift of a voltage input.

- [c16] 16.The MRI apparatus of claim 10 wherein the birdcage arrangement includes an inferior end-ring and a superior end-ring, and wherein the number of drive ports are connected to only one of the inferior end-ring and the superior end-ring.
- [c17] 17.The MRI apparatus of claim 10 wherein a drive port is configured to be driven by an input that is 90 degrees out-of-phase of an input applied to a neighboring drive port.
- [c18] 18.The MRI apparatus of claim 10 wherein the RF coil assembly includes four drive ports and sixteen RF coil elements.
- [c19] 19.A method of driving coils of an MR coil assembly to reduce subject asymmetry input in a polarized RF field independent of subject asymmetry, the method comprising the steps of:  
providing a pair of power inputs;  
splitting each power input into a pair of driving inputs;  
inputting each driving input to a balun; and  
inputting an output of each balun to a respective MR coil drive port of an MR coil assembly for generation of an RF field about a volume-of-interest.
- [c20] 20.The method of claim 19 further comprising the step

of splitting each input such that the driving inputs are shifted 90 degrees out-of-phase from one another.

- [c21] 21.The method of claim 19 further comprising the step of inputting a first driving input of a pair of driving inputs to a first balun and inputting a second driving input of the pair of driving inputs to a second balun, and wherein the first balun is electrically connected to a drive port that is not a neighbor of a drive port connected to the second balun.
- [c22] 22.The method of claim 19 further comprising the step of impedance matching the pair of voltage inputs before inputting the driving inputs to respective baluns.
- [c23] 23.The method of claim 19 wherein the RF coil assembly includes sixteen coils arranged in a birdcage coil arrangement, and wherein each MR coil assembly drive port is connected on a common end-ring.